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Systematics of the *Vipera xanthina* complex (Reptilia: Viperidae) II. An overlooked viper within the *xanthina* species-group in Iran

by

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History

During an expedition in 1846 to lake Urmia in the Persian province Azarbaijan, Wagner collected a viper which Berthold (1850) classified as *Vipera aspis* Merr. (Varietas *V. ocellata*, Latr.) in Wagner's "Reise nach Kolchis", a small travel book published in 1850. The species is listed in the paper by Berthold in the paragraph „Von der Armenisch-Persischen Grenze", but without precise locality. A short description is given which states 150 ventrals and 23 subcaudal pairs.

This specimen is discussed by Strauch in his "Synopsis der Viperiden" (1869) and "Die Schlangen des Russischen Reiches" (1873) and he included it in *Vipera xanthina* (sensu lato). The specimens of *V. xanthina* (= *V. raddei*) available to Strauch had a much higher ventral count (170–176) and subcaudal count (27–32) which is typical for the Armenian *V. raddei*. Strauch was of the opinion that the Wagner specimen represented the lower border of these characteristics and thus verifying the great variation in morphology in his *V. xanthina*.

While reviewing the literature and examining specimens within the *V. xanthina* complex it became evident that this Wagner specimen did not, according to the data given by Berthold, fit in with the currently recognized taxa of this group in this area. The number of ventrals mentioned is lower than is found in the *V. raddei* species-group and a similar low number of subcaudals (23) is only found in *V. bornmuelleri* from Lebanon and Syria.

For our current study of this group it became important to examine the Wagner specimen if it still was available. All Wagner and Berthold material was stored in Goettinger Museum (Strauch 1869) until recently when it was moved to and incorporated in Zoologisches Forschungsinstitut und Museum A. Koenig in Bonn (Böhme, in litt.). Due to kind help from Dr. Böhme the Wagner specimen was found hidden under the name *Vipera lebetina*. In the old hand written collecting-catalogue from Goettingen the specimen is listed under the name

"*Vipera aspis*, Urmia, M. Wagner, 1846". This was later changed to "*V. xanthina*, nach Strauch", and still later someone crossed the word *xanthina* and replaced it with *lebetina*. Because of this the specimen was hidden during a first request of available material of the *xanthina—raddei* taxa in the Bonn Museum. Thanks to Dr. Böhme this specimen (now ZFMK 32495) was finally recognized and sent to us on loan.

This Wagner viper described by Berthold 1850 as *Vipera Aspis* Merr. (Varietas *V. ocellata*, Latr.), has a pattern which is similar to that found in *Vipera aspis hugyi*. The name *Vipera ocellata* was originally given by Latreille 1802, for a strongly spotted French *Vipera a. aspis*. The name has meanwhile also been applied in the Calabrian/Sicilian *V. aspis hugyi* (e. g. Reuss 1930) which is characterized by marked dorsal pattern along the back. Berthold actually did refer it to Latreille's *ocellata* and not as a new subspecies of *V. aspis* as Strauch (1869, 1873) and Nikolski (1905, 1964) claimed. Berthold was obviously of the opinion that he had found a specimen of the *ocellata* variety of *V. aspis* due to similarity in pattern.

This Urmian ocellated viper was incorrectly referred to as a junior synonym of *Vipera xanthina* (Strauch 1869, 1873) and as a senior synonym for *V. raddei* (Nikolski 1905, 1964) as *V. aspis ocellata* Berthold (non Latreille) and has as such currently been treated as verification for the occurrence of *V. raddei* in the region of lake Urmia in Iran (e. g. Bedriaga, 1880; Boulenger, 1896; Schwarz, 1936). *Vipera raddei* does as well occur in that region (1984, in press) but no published reports based on real *raddei* specimens have appeared so far. The Urmia viper does actually not at all belong to the *raddei* species-group (*raddei*, *latifii* and a new west Iranian viper [Nilson & Andrén, in press]) but to the *xanthina* species-group (*xanthina*, *bornmuelleri*). The Urmia viper lacks a complete circumocular ring, has only one canthal on each side, lacks angled raised supraocular plates and has a non-inverted "ocellated" pattern which easily can be derived from the female *xanthina* and *bornmuelleri* patterns.

The origin of the Wagner viper from the vicinity of the Urmia lake, at the „Persisch-Armenischen Grenze" is clearly verified by the presence of the actual specimen in the old Wagner collection, as well as by its history in literature. The peculiar morphology of the specimen as noted by Berthold, is also mainly verified by the specimen at hand. Thus the occurrence of such vipers somewhere in the vicinity of lake Urmia must certainly be the case.

Taxonomic conclusion

The systematics of the advanced vipers of the Middle East, here referred to as the *Vipera xanthina* complex, is in its present form inaccurate or incomplete as it still does not allow all local populations to fit in with currently recognized taxa. The *Vipera raddei* species-group is probably sympatric with the Wagner

viper as this group is distributed in most parts of northwestern Iran, including province Azarbaijan. However, this is a clearly monophyletic group characterized by a series of derived characters which well separates it from other species of advanced vipers in the Middle East. Morphological characters unique for this group are a complete inner circumocular ring which separates eye from the raised and angled supraocular plate and two or more canthal scales on each side between the supraocular and supranasal plates. In this part of Iran the *raddei* taxa are also characterized by having a reduced pattern which is inverted, i. e. light dorsal pattern on dark ground colour and a very high number of subcaudals (28–32, $\bar{x}$ = 29.9 ± 0.2 S. E. in 33 female specimens from this group [*V. raddei* s. str. in USSR and Turkey, *V.* cf. *raddei* in Iran]).

On the contrary the Wagner viper seems to be much closer, although not identical, to the *xanthina* species-group. The actual number of ventrals (161, not 150 as originally stated) agrees well with *V. xanthina*; the low number of subcaudals (23/24) agrees with *V. bornmuelleri*. The pattern is very similar to some female *V. xanthina* and female *V. bornmuelleri*. This allopatric species-group (containing *xanthina* and *bornmuelleri*) is characterized and separated from the *raddei* group by having supraocular plates in contact with eye, supraoculars not erected (can be slightly raised in some *xanthina* and *bornmuelleri* but never angular as in *raddei*), in having less than two canthals on each side and in being much stouter than the slender *raddei*. The Wagner viper agrees in all these characteristics with the *xanthina* group and can clearly be referred to this group.

Now, the collecting locality is separated widely from the other *xanthina* (western half of Turkish Anatolia) and *bornmuelleri* (Lebanon and Syria) populations and the question raises on to which taxa should this specimen be referred? Although closely related to these species it is clearly distinct from both, and the question whether it is separated on species level or not can at present not certainly be answered. However, the difference seems to be of similar category between this Wagner viper and specimens of *xanthina* or *bornmuelleri* as it is between these last two taxa. *Vipera xanthina* and *V. bornmuelleri* are also separated geographically by a rather large distance and these two taxa have currently been treated as full species in recent literature (an opinion which we share after examination of larger series of all concerned taxa).

Partly because of this and partly due to its certainly sympatric occurrence with *V. raddei*, large distance from the *V. xanthina–bornmuelleri* populations and because of a unique combination of characters which separates it from all presently known taxa and populations we place the Wagner viper as a new species within the *xanthina* species-group:

Vipera wagneri sp. n.

Holotype: ZFMK 23495, a juvenile female from the vicinity of lake Urmia ("Armenisch-Persische Grenze"), province Azarbaijan, N. W. Iran. Leg. Moritz Wagner 1846.

Diagnosis: A species of *Vipera* belonging to the *V. xanthina* species-group and thus lacking a complete circumocular ring and with the supraocular plates in broad contact with eye, no raised or angular supraocular plates, only one canthal on each side and having a well developed rhomboid (ocellated) dark dorsal pattern along the back on a lighter ground colour. The single female specimen at hand differs from *V. xanthina* in having more intercanthals, more first circumoculars, fewer subcaudals and only nine supralabials. It differs from *V. bornmuelleri* in having more ventrals, a single canthal on each side and fewer intersupraoculars. The dorsal pattern is similar to that found in some female *V. xanthina* and *V. bornmuelleri.*

Fig. 1. Dorsal view of the holotype of *Vipera wagneri* sp. n. (ZFMK 32495). Total length 29.1 cm.

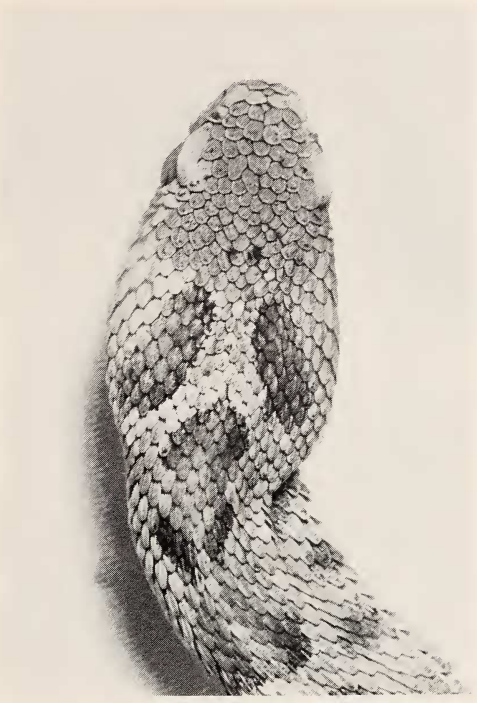

Fig. 2. Dorsal view of the head of the holotype of *Vipera wagneri* sp. n.

It differs from *V. raddei* and allied populations in Iran and from *V. latifii* in the absence of a complete circumocular ring, which in these taxa separates eye from supraocular, in having a single canthal on each side, in lacking erected supraocular plates, in a different pattern and in a much lower number of subcaudal plates. From *V. raddei* it also differs in having a lower number of ventrals.

Description of holotype: A young female with a total length of 291 mm and tail of 21 mm. Head covered by small scales except enlarged supraocular plates, which are separated from each other by six interocular scales. One canthal between supraocular and supranasal on each side and two apicals in contact with rostral. Fourteen intercanthals and 29 intersupraocular scales on upper surface of head. Supraoculars not raised and in broad contact with eye. Two subocular rows. First circumocular ring (except supraoculars) containing 15 and 14 scales on right and left side of head respectively. Second distal circumocular ring contains 14 and 16 scales on right and left side respectively. Nine supralabials on each side and 13 and 12 sublabials on right and left side respectively. Three preventrals followed by 161 ventrals and a single anal plate. Subcaudals in 24 and

23 rows on right and left side respectively. Body with 25 transverse scale rows one head length posterior of head, 23 scale rows on midbody and 17 scale rows one head length anterior to anal.

Dorsal pattern consists of yellowish brown slightly irregularly round blotches which especially at anterior and posterior ends are surrounded by a dark brown border. Ground colour greyish. Belly grey with weak darker halfmoon shaped spots. Posterior half of body faded in colour and with dermis partly loose from body. Number of dorsal blotches in pattern estimated to about 24 on body which is similar to *V. xanthina* but much lower than in the *V. raddei* species-group. Two elongated angular spots on neck and a dark narrow band from eye to corner of mouth. Labial areas and side of head light in colour.

Discussion: The original description given by Berthold (in Wagner, 1850) states: "Schuppen gekielt in 23 Reihen. Bauchschilder 150; Schwanz-Schildpaare 23. Körper 10 Zoll, 6 Linien; Schwanz 10 Linien lang. Oben mit gelben, braun umsäumten Netzflecken; unten grau, grünlich marmorirt; hinter Auge eine schmale lange dunkle Binde, auf jeder Seite des Hinterhaupts ein schräger breiter dunkler Strich. Kopf oben rund mit kleinen gleichartigen Schuppen, aber über Augen ein Schild." The reexamination of the specimen gives equal results in most of the characteristics mentioned by Berthold, including head, body and belly pattern, size of supraoculars, number of subcaudals, number of midbody scale rows and tail length (21 mm, compared to the original value of 10 linien = 10th part of "Zoll" = 1 inch = 25 mm). However, the number of ventrals is 161 (following the Dowling method) and not 150 as originally stated. Posterior

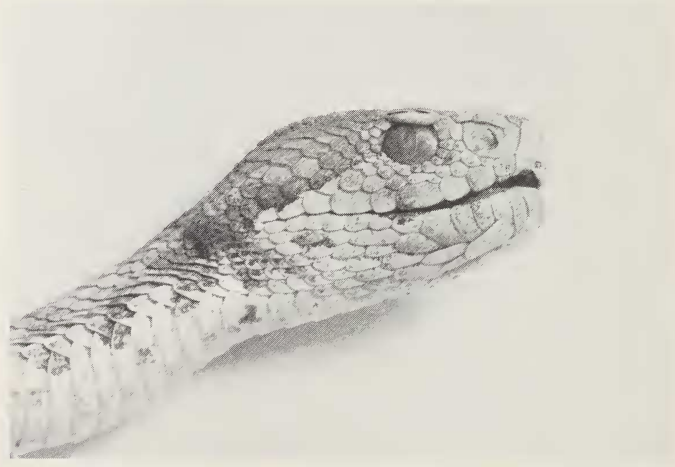

Fig. 3. Lateral view of the right side of head of the holotype of *Vipera wagneri* sp. n. — Photographs: Göteborg Natural History Museum (Håkan Berg)

half of body is in bad condition and it is not easy without a stereo microscope to count the real number of ventrals on body and this might have been the reason for the lower count made by Berthold in those days. Head and body length is 270 mm instead of about 250 mm which is equal to "10 Zoll, 6 Linien" as suggested by Berthold. Then again, the ill preserved posterior part of the body is certainly the reason for the different measurement obtained.

Vipera wagneri differs from the probably sympatric *V. raddei* (sensu lato) in having supraoculars in broad contact with eye; only one canthal scale on each side of head; in having fewer ventrals (161 compared to 165 or more in 36 female *raddei* s. lat.); fewer subcaudals (23/24 compared to 28 or more in female *raddei*); a short squarish upper preocular (very long and narrow in *raddei*) and a different pattern.

From *Vipera latifii* the new viper differs also in having supraoculars (which are not raised neither angled) in broad contact with eye; single canthal on each side of head; fewer subcaudals (23/24 compared to 27 or more in 13 female *latifii*); fewer scales in the interocular row (6 compared to 7 or more in *latifii*) and a different pattern.

From *Vipera xanthina* and related populations in western and southern Anatolia it differs in having more intercanthal scales (14, normally fewer in *xanthina*); fewer subcaudals (23/24 compared to 27 or more in 33 female *xanthina*); more scales in first circumocular ring (29 counted together on both sides, compared to 28 or less in *xanthina*) and nine supralabials on each side (usually ten in *xanthina*).

From *Vipera bornmuelleri* it differs in having fewer intersupraoculars (29 compared to 30 or more in 25 *bornmuelleri*); more ventrals (161 compared to 153 or less in 15 female *bornmuelleri*) and more first circumocular scales (29 on both sides together compared to less in 96 % of the examined *bornmuelleri*, equal in one specimen [=4 %]).

All *V. raddei* and *V. latifii* have raised and angular supraoculars which are separated from the eye by granular scales. This gives an apperance of a "horned" head in these taxa. Also *V. xanthina* and *V. bornmuelleri* have these slightly raised supraoculars giving the impression of a more or less raised eyebrow although less pronounced than in the *raddei* group. *Vipera wagneri* totally lacks raised supraoculars and differs in this character from all other taxa within this complex. Other unique diagnostic characters for *V. wagneri* are a very slender posterior region of the head and a belly pattern consisting of irregularly dispatched islands of yellowish brown blotches and spots on a whitish grey ground colour.

Origin: It has not been possible to establish the exact position of the type locality which is given as "Urmia" and „die Armenisch-Persische Grenze". In 1846, when the snake was collected, the border between Armenia and Persia was

about the same as between USSR and Iran today, which is about 80 km north of lake Urmia. Lake Urmia is a large lake of about 140 km greatest length. Due to the travel route made by Moritz Wagner in 1846 and the mentioning of both Urmia and the border it seems probable that the type locality should be somewhere close to the northern parts of the lake. There are several mountain areas just north of the lake, such as Meshow Dagh (2534 m altitude), Kuh-e Almdar (3155 m) and Kuh-e-Falahk (3125 m) and further north, closer to the USSR border there is the Quarajeh Dagh mountain ridge which has peaks of more than 3300 m altitude. Any of these areas may be the place of origin of this viper, especially as the old Persian-Armenian border has changed during history and also been situated further south than today.

Urmia is also the old name for the town Rezaiyeh on the west side of lake Urmia and it cannot be excluded that the specimen came from the western mountains more close to the Turkish border. However, Wagner never was in those regions during his journey.

Sympatric vipers: Apart from *V. raddei* s. lat. which is distributed in most adjacent areas around the lake Urmia and in many other parts of province Azarbaijan in Iran (in prep.), *Vipera lebetina obtusa* occurs in the region. Also *Vipera ursinii eriwanensis* and *Pseudocerastes persicus* cf. *persicus* are reported in literature from this region (e. g. Joger, 1984). However, all these three vipers occupy different habitats compared to what is typical for members of the *xanthina* complex. Both *Vipera lebetina* and *Pseudocerastes* are found below 1500 m altitude and inhabit much drier areas such as subdesert steppe (Joger, 1984). *Vipera ursinii* is found in high mountain steppes and meadow habitats. The members of the *V. xanthina* complex inhabit rocky areas often at higher altitudes and this is probably the habitat chosen by *V. wagneri*.

Etymology: The new species is named after its collector Moritz Wagner, who was an important naturalist traveller in the middle of the nineteenth century.

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Summary

A unique specimen of *Vipera* collected in 1846 and originally included in *Vipera aspis ocellata* and later synonymized with *V. xanthina* (s. lat.) and *V. raddei* is here classified as a unique species *Vipera wagneri* sp. n. The type locality ("Urmia"), not exactly known, is in N. W. Iran where also *V. raddei* is distributed. The new species belongs to the *V. xanthina* species-group (*xanthina* in west and south central Turkish Anatolia and *bornmuelleri* in Lebanon and adjacent Syria) and is characterized by having a well developed rhomboid (ocellated) dorsal pattern, supraoculars large but not raised or angular and in broad contact with the eye, a single canthal scale, few subcaudals and some other scalation characters.

Zusammenfassung

Ein Einzelexemplar der Gattung *Vipera*, 1846 gesammelt und ursprünglich als *Vipera aspis ocellata* bezeichnet, später aber mit *V. xanthina* (s. l.) und *V. raddei* synonymisiert, wird hier als neue Art beschrieben: *Vipera wagneri* sp. n. Die Typuslokalität ("Urmia"), nicht exakt bekannt, liegt im NW-Iran, wo auch *V. raddei* vorkommt. Die neue Art gehört zur *V. xanthina*-Gruppe (*xanthina* im westlichen und südlich-zentralen Anatolien sowie *bornmuelleri* im Libanon und im angrenzenden Syrien) und ist charakterisiert durch ein gut ausgeprägtes dorsales Rhombenmuster, durch große, aber nicht aufgeworfene oder winklige Supraocularia, die breit ans Auge stoßen, durch ein einziges Canthale, wenige Subcaudalia sowie einige andere Pholidosemerkmale.

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